

AK

Notice of Allowability	Application No.	Applicant(s)	
	10/626,884	KIM, JIN-HYUN	
	Examiner	Art Unit	
	Raquel Y. Gordon	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to this application filed 7/25/2003.
2. ☒ The allowed claim(s) is/are 1-19.
3. ☒ The drawings filed on 25 July 2003 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

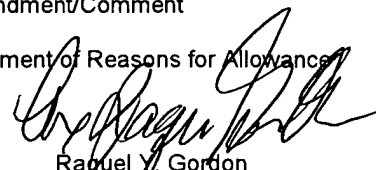
* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. |
| 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date <u>7/03 & 9/04</u> | 7. <input type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |


Raquel Y. Gordon
Primary Examiner
Art Unit: 2853

Allowable Subject Matter

The following is a statement of reasons for the indication of allowable subject matter: The claimed ink-jet printing head and method of manufacturing thereof is not taught by the art of record.

The primary reasons for allowance are the following claimed combinations are not taught by the prior art (emphasis added with bolding and underlining):

1. An ink-jet printhead comprising: a substrate in which a manifold supplying ink is formed; a nozzle plate which is formed to be spaced-apart from the substrate by a predetermined gap and in which a nozzle through which ink is ejected is formed; a barrier wall which seals a space formed between the substrate and the nozzle plate and defines an ink chamber filled with the ink to be ejected, an ink channel connected to the ink chamber, and an ink feed hole connecting the ink channel to the manifold; and an insulating layer which is formed on the substrate and forms lower walls of the ink chamber, the ink channel, and the ink feed hole, where a heater generating bubbles by heating the ink filled in the ink chamber is formed on the lower walls of the ink chamber; wherein the ink feed hole includes a plurality of through holes which perforate the insulating layer and through which the ink channel is connected to the manifold, and **a plurality of posts which are formed on the insulating layer and support the nozzle plate.**

2. The printhead of claim 1, wherein the through hole has the same depth as the insulating layer.

3. The printhead of claim 1, wherein the through hole is formed to be deeper than the insulating layer in a direction parallel to an ink ejection direction by etching the insulating layer and the surface of the substrate.
4. The printhead of claim 1, wherein the barrier wall is formed of polyimide.
5. The printhead of claim 1, wherein the posts are formed of polyimide.
6. A method of manufacturing an ink-jet printhead, the method comprising: forming an insulating layer on a surface of a substrate and forming a heater on the insulating layer; forming a plurality of grooves having a predetermined depth in the insulating layer; forming a barrier wall which defines an ink chamber, an ink channel, and an ink feed hole, and **a plurality of posts on the insulating layer in which the grooves are formed**; coating a predetermined material on the insulating layer on which the barrier wall and the posts are formed and planing top surfaces of the barrier wall and the posts; forming a nozzle plate on the top surfaces of the barrier wall and the posts; forming a nozzle through which the predetermined material is exposed in the nozzle plate; forming a manifold through which the predetermined material filled in the grooves is exposed by etching a lower surface of the substrate; and forming the ink chamber, the ink channel, and the ink feed hole by removing the predetermined material exposed through the nozzle and the manifold.

7. The method of claim 6, wherein the forming of the barrier wall comprises: forming a predetermined material layer on the insulating layer; and patterning the material layer and forming the barrier wall and the posts.

8. The method of claim 7, wherein the material layer is formed of polyimide.

9. An ink-jet printhead comprising: a substrate having a manifold supplying ink; a nozzle plate having a nozzle; a barrier wall formed between the substrate and the nozzle plate to form an ink chamber communicating with the manifold and the nozzle; and a plurality of posts disposed in the ink chamber, formed between the substrate and the nozzle plate, and spaced-apart from each other to support the nozzle plate with respect to the substrate.

10. The printhead of claim 9, wherein the substrate comprises: a plurality of through holes formed on the substrate to guide ink to flow from the manifold to the ink chamber.

11. The printhead of claim 10, wherein the through holes are disposed between the posts.

12. The printhead of claim 11, wherein the through holes are spaced-apart from each other.

13. The printhead of claim 19, wherein the posts have the same height as the barrier wall.

14. The printhead of claim 9, wherein the ink chamber comprises a first portion corresponding to the nozzle and a second portion corresponding the manifold, and the posts are disposed in the second portion of the ink chamber.

15. The printhead of claim 9, wherein the posts are disposed in a direction parallel to an ink ejection direction.

16. The printhead of claim 9, wherein the posts are spaced apart from each other in a direction perpendicular to an ink ejection direction.

17. An ink-jet printhead comprising: a substrate having a manifold supplying ink; a nozzle plate having a nozzle; a barrier wall formed between the substrate and the nozzle plate to form an ink chamber and an ink feed hole portion communicating with corresponding ones of the nozzle and the manifold; and a plurality of posts disposed in the ink chamber, formed between the substrate and the nozzle plate, and spaced-apart from the barrier wall to support the nozzle plate with respect to the substrate.

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18. The printhead of claim 17, wherein the barrier wall forms an ink channel between the ink feed hole portion and the ink chamber.

19. The printhead of claim 18, wherein the posts are not disposed in the ink channel and the ink chamber.

While Park et al. (US006806108B2) teach a substrate 110, a manifold 112, nozzle 118, nozzle plate 18, ink, barrier wall (portion of 120), ink chamber 116, an ink channel 114, an ink feed hle 114, an insulating layre 122, a heater generating bubbles (124) and low walls (see figure 4a), Park et al. does not teach:

a plurality of posts which are formed on the insulating layer and support the nozzle plate;

a plurality of posts on the insulating layer in which the grooves are formed;

a plurality of posts disposed in the ink chamber, formed between the substrate and the nozzle plate, and spaced-apart from each other to support the nozzle plate with respect to the substrate; and

a plurality of posts disposed in the ink chamber, formed between the substrate and the nozzle plate, and spaced-apart from the barrier wall to support the nozzle plate with respect to the substrate.

Whie Furusawa et al. (US 20040000429) teach a perforated insulation layer, it does not teach a perforated insulation layer with posts formed thereon to support the nozzle plate. For example, Furusawa et al. teach an insulating layer 53 formed on top of conductive posts 52. Further, pads 44 and bumps 56 are formed on the exposed

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portions of the posts (see ¶¶ 0122 and 0123). It is the Examiner's position this is not the same teaching nor an obvious teaching of the instant invention.

Hence since the prior art is not taught by the art of record, the claims are allowed. The dependant claims are primarily allowed since they depend from allowed base claims.

Contact Information

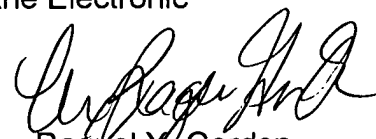
Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Raquel Y. Gordon, whose telephone number is (571) 272-2145. The Examiner can normally be reached on M Tu Th and F 8:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. A fax number is available upon request.

Any inquiry of a general nature or relating to the status of this application or proceeding may be directed to the Examiner or Supervisor.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Raquel Y. Gordon
Primary Examiner
Art Unit 2853
January 5, 2005